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LX3V-2TC2DA

BD Board
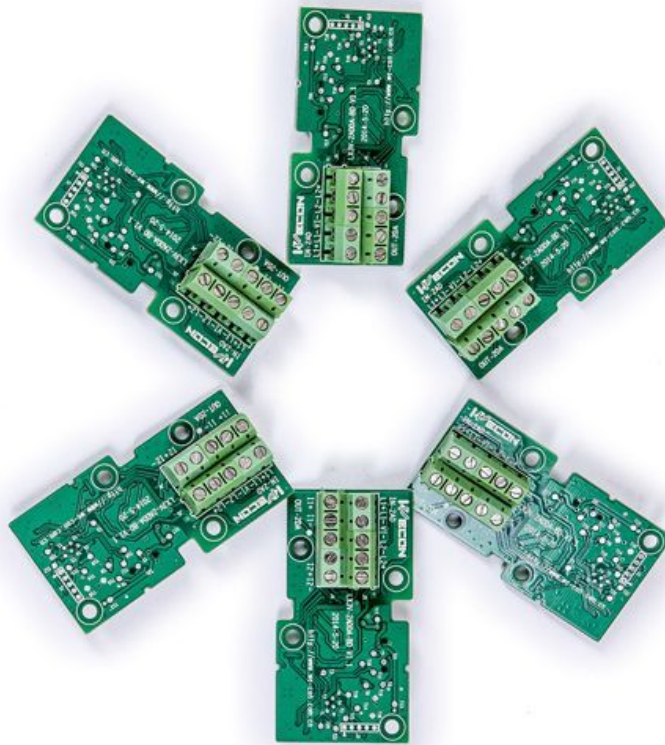
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Ⅰ. Mounting instruction

Before the installation must be ensure that the PLC host and BD associated equipment power off. Please install the BD board in the corresponding position of the PLC, and lock the four standard screws. If environmental dust is bigger, please cover BD right part by PLC's cover. Please do not power operation.

Caution:

1. When output current, make sure that the load resistance should be less than 500 Ω, otherwise the output will be lower.

2. Fix BD board on the PLC, poor contact lead to failure.

Warring: make sure to power off the PLC before mounting or removing the BD module.

Ⅱ. The features of LX3V-2TC2DA-BD

1. Using LX3V-2TC2DA-BD can increase the two analog input points, two analog output points. If you use this module, it is being installed on the top of the PLC, so there is no need to change the installation area of the PLC.

2. The type to AD convert of LX3V-2TC2DA-BD is a thermocouple input type (K/J), and the converted digital value of each channel is stored in special registers, but the mode of analog-to-digital conversion cannot be changed. The corresponding channel as following table shows.

Table 1 LX3V-2TC2DA-BD address assignment

Address	Instructions
M8112	The flag of thermocouple switch in CH1 OFF: K type ON: J type
M8113	The flag of thermocouple switch in CH2 OFF: K type ON: J type
M8114	The flag of output mode in CH3 OFF: Current output mode(4-20mA, 0-2000) ON: Close the output mode

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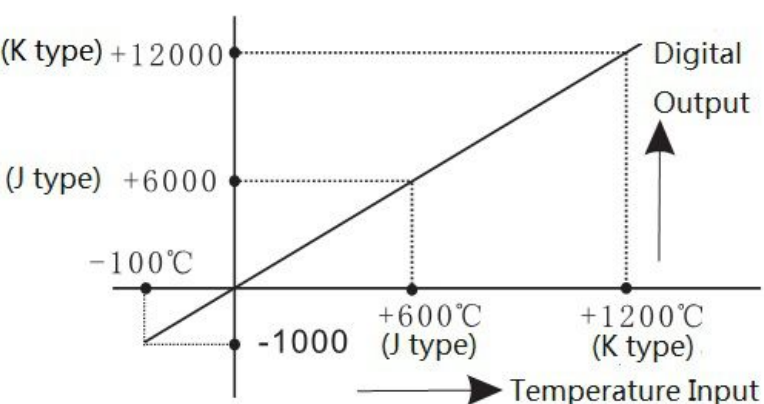| M8115	The flag of output mode in CH4 OFF: Current output mode(4-20mA, 0-2000) ON: Close the output mode
D8112	CH1 temperature (unit: 0.1)
D8113	CH2 temperature (unit: 0.1)
D8114	CH3 digital value
D8115	CH4 digital value

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Ⅲ. Terminal Description and shape
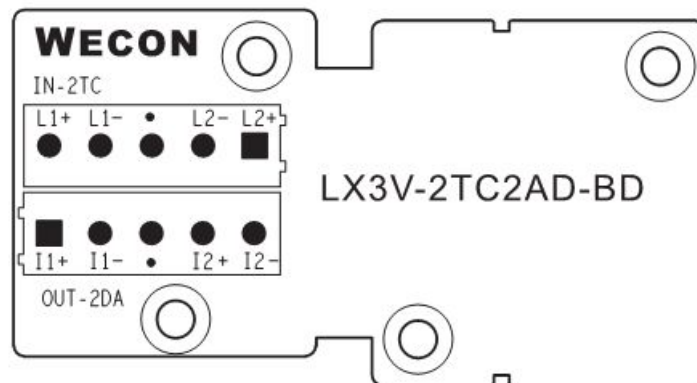
IN part	
Applied sensor: 2-wire thermocouple(K/J)	
L1+	Positive pole of CH1's sensor
L1-	Negative pole of CH1's sensor
VI-	None
L2+	Positive pole of CH2's sensor
L2-	Negative pole of CH2's sensor

OUT part	
The range of output is 4-20 mA	
I1+	Positive pole of CH1's output
I1-	Negative pole of CH1's output
•	None
I2+	Positive pole of CH2's output
I2-	Negative pole of CH2's output

Ⅳ. The specification

1. **General specification:** same as PLC main unit.
2. **Power supply specifications:** power supply by PLC.
3. **Performance specifications:**

Item	Explanation			
Analog circuitry	DC 24V ±10%, 70mA			
Digital circuitry	DC 5V, 90mA (From the PLC internal power supply)			
Temperature	Read data by buffers			
Analog input signal	Thermocouple: K or J type (2 channels)			
Range of rated temperature	K	-100℃ - 1200℃	J	-100℃ - 600℃
Digital output	K	-1000 - 12000	J	-1000 - 6000
	12 bits total			
Accuracy	K	0.4℃	J	0.3℃
Overall accuracy	±0.5%			
Conversion rate	50ms*2			
Conversion characteristics				

V. Wiring

Warning: Please cut off the power firstly, before installation / removal of expansion boards to avoid electric shock or damage to the product.

Note:

1. Stay away from high-voltage cables to avoid interference or surge;

2. Grounding is required, but please do not share the ground site with high-voltage cable.

3. Do not weld any cable ends, and make ensure that the number of connecting cables, no more than a predetermined number.

4. Do not connect a substandard cable.

5. Fixed cable.

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1. Cable

- Connecting output device by AWG25-16.
- Terminal maximum tightening torque is 0.5 to 0.6 N.m

Types of cables and cross-sectional area

Type	Cross-sectional(mm²)	End
AWG26	0.1288	Stranded cable: Strip the sheath, matching core wire connection cable.
.	.	
.	.	
AWG16	1.309	Single cable: Strip the sheath, connecting cables
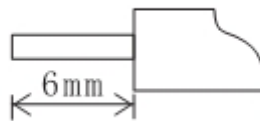
2. I/O mode

- Thermocouple input mode
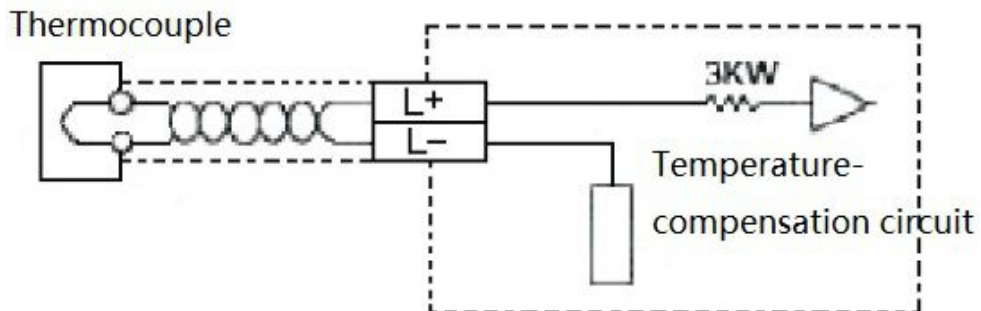
- Current output mode

VI. Programming

The analog values of each channel are transfer to digital values and stored in D8112&D8113.

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1. Basic programming example

Set CH1 and CH2 as thermocouple input mode, and stored value in D0 and D2.

```
M8000
├──┤ ├────────────────[RST    M8112 ]    Set CH1 as K-type thermocouple input mode
│          ├───────────[RST    M8113 ]    Set CH2 as K-type thermocouple input mode
│          ├───────[MOV  D8112   D0  ]    Write CH1's value to D0
│          └───────[MOV  D8113   D2  ]    Write CH2's value to D1
```
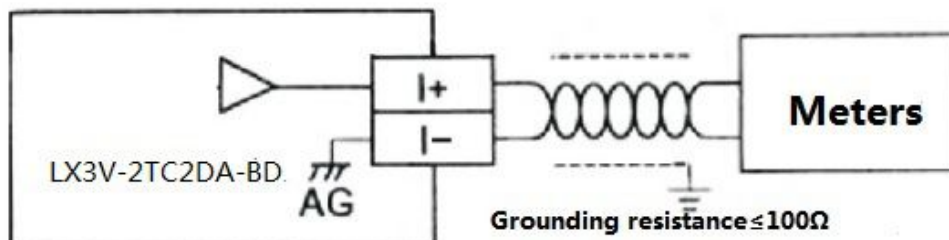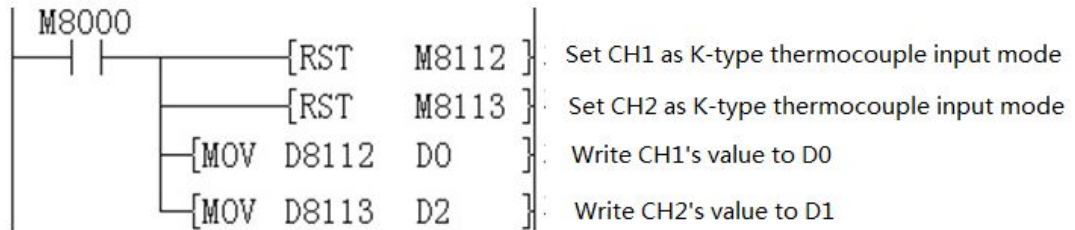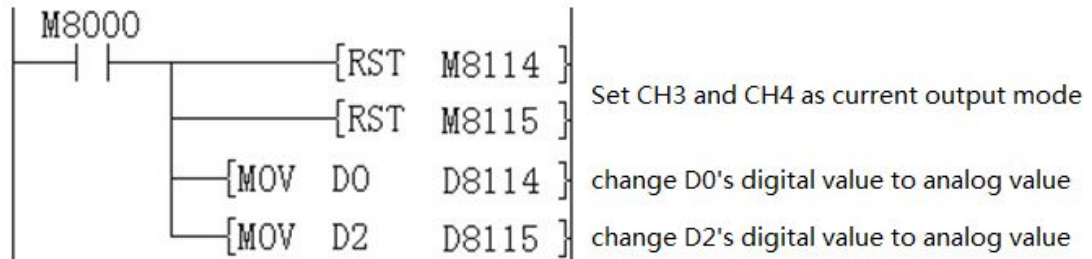
Set project as output mode.

```
M8000
├──┤ ├────────────────[RST    M8114 ]
│          ├───────────[RST    M8115 ]    Set CH3 and CH4 as current output mode
│          ├───────[MOV   D0    D8114 ]   change D0's digital value to analog value
│          └───────[MOV   D2    D8115 ]   change D2's digital value to analog value
```

2. Application programing

Because LX3V-2TC2DA-BD no offset and gain function, so if the value is outside the range of values, it requires to use the four operations to complete the conversion.
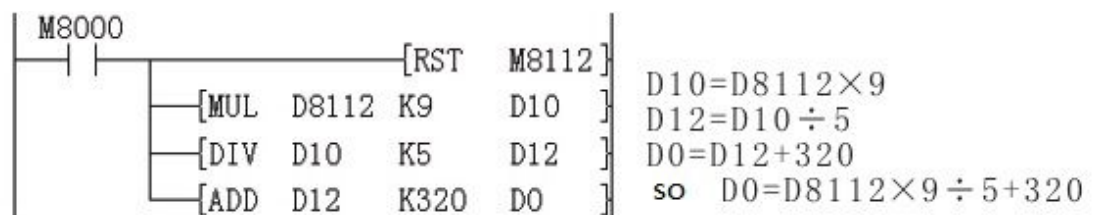
Note:

- Because the use of additional programming instructions, so the accuracy and resolution of analog to digital conversion are changed;
- Original range of the analog output will not change;

Thermocouple input mode：

In Thermocouple input mode, 2TC covert a analog value to a digital value in degrees Celsius. If in the program is Fahrenheit as a unit it needs to be converted to Celsius value.

Fahrenheit and Celsius conversion formula, Fahrenheit = Celsius * 9/5 + 32, the unit is 0.1 ℃

```
M8000
├──┤ ├────────────────────[RST    M8112]   D10=D8112×9
│          ├──[MUL  D8112  K9    D10 ]      D12=D10÷5
│          ├──[DIV  D10    K5    D12 ]      D0=D12+320
│          └──[ADD  D12    K320  D0  ]      so  D0=D8112×9÷5+320
```

Current output mode：

In current output mode, 2TC covert digital value (0-2000) into an analog value (4-20mA). If the range of digital in the program was 0-A, it must be converted to 0-2000.

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```
M8000
 ┤├                          ┤RST   M8114┤  D8114=2000×D0÷A
              ┤DIV   D0    K5     D2    ┤         =2000×D0÷10000(A=10000)
                     ┤MOV   D2    D8114┤         =D0÷5
```